

REVISION OF STENOPETALUM (CRUCIFERAE)

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OF THE SEVERAL GENERA OF Cruciferae endemic in Australia, the most striking is *Stenopetalum*, a genus of eight species characterized by flowers in which the calyx is erect and closed and the narrow petals are drawn out into a long, slender and often twisted tip. Flowers of this general sort are seen in some American genera such as *Schizopetalon* and *Lyrocarpa*, but it is a type not common in the Cruciferae and among Australian genera these elongated petals are so distinctive that each species of *Stenopetalum* was initially described in that genus and none has undergone the nomenclatural vicissitudes of other Australian members of this family. Similar flowers occur in *Carinavalva glauca* Ising, but this rare species, seemingly restricted to a small area in the far north of South Australia, has many-seeded obcompressed siliques, a fruit type not found in *Stenopetalum*.

Stenopetalum lineare was the first Australian species of this family known to science, the specimens brought back by Robert Brown who served from 1801 to 1803 as naturalist under Matthew Flinders on H. M. S. *Investigator*. Flinders' charge, politically motivated and intended to forestall French activity in Australian waters, was to complete the survey of the coast of New Holland and it is interesting that his orders from the Lords Commissioners for the Admiralty included detailed instructions for the construction on the quarter deck of the *Investigator* of a "plant cabin," intended for "such plants, trees, shrubs, &c., as they [the naturalist and the gardener] may think suitable for the *Royal Gardens at Kew*" After one and one-half years of exploration the *Investigator* was pronounced unfit for the return voyage to England so the living plants collected by Brown and Peter Good, the gardener, were transferred at Sydney to H. M. S. *Porpoise*. Fortunately Brown and his artist, Ferdinand Bauer, remained in New South Wales, retaining there the bulk of the dried collections, for the *Porpoise* and the living plants were lost — wrecked on the Great Barrier Reef. Brown returned to England in 1805 and the collections became the basis for his *Prodromus Florae Novae Hollandiae*.

During Brown's years in Australia he became familiar with some of the most spectacular plants of the flora and it is perhaps understandable that he was not impressed by Australian Cruciferae. His published work makes only the briefest reference to the family, and although Brown recognized *S. lineare* as representing a distinct genus, he did nothing with the material and finally passed it on to De Candolle for description in *Systema Naturale*. The next species described, *S. robustum* of Western Australia, was correctly placed by Endlicher in *Stenopetalum* as were the species subsequently described by Mueller and by Bentham. However,

of three species figured during the 1840's in *Icones Plantarum* and described by one or the other of the Hookers in *Stenopetalum*, two are now referred to *Menkea* Lehm. and one is the widespread halophyte *Hutchinsia procumbens*.

MORPHOLOGY AND BIOLOGY

Most species of *Stenopetalum* are annuals, although *S. decipiens* of central Australia is a woody perennial and a coastal form of the widespread and variable *S. lineare* is woody and perennial. The genus is represented in all states, including Tasmania, and in the Northern Territory and is predominantly Eremaean although *S. robustum* of Western Australia is coastal in habitat and there is the coastal form of *S. lineare* just mentioned. With the exception of *S. robustum*, in which the valves are compressed parallel to the septum, all species have short siliques which are globose to (ob-)ovoid and round in section. The pedicels are variable in length and orientation and provide some useful diagnostic characters. The seeds of all species are strongly mucose when moistened, the thick perisperm immediately producing a broad band of radiate mucus. Except in the tuberculate or verrucose seeds of *S. nutans* and *S. velutinum*, the testa is smooth and there are otherwise no characters of real diagnostic or taxonomic value observable in the seeds.

Pubescence is quite variable. *Stenopetalum decipiens*, *S. velutinum*, and *S. lineare* are pubescent with irregularly branched trichomes. Those of the first two species are nearly sessile with very long, horizontally spreading rays which in *S. decipiens* are almost inextricably interwoven into a dense felt. Trichomes of *S. lineare* are similar but smaller and less elaborately branched. *Stenopetalum nutans* is unique in the genus in being sparsely pubescent with malpighiaceae trichomes. The other four species are apparently glabrous, papillose, or pubescent with simple trichomes. This represents a difference of degree rather than of kind and on plants of *S. robustum* and *S. filifolium* there can be both papillae and short, simple, rather crinkled trichomes. The cauline leaves are generally entire or dentate in *S. velutinum*, *S. decipiens*, *S. robustum*, *S. filifolium*, and *S. nutans*; *S. anfractum*, *S. lineare*, and *S. sphaerocarpum* have lower cauline leaves which are pinnatisect or trifid as in some species of *Arabidella*, although in all three the upper leaves may be entire and the coastal form of *S. lineare* includes plants with all the cauline leaves entire.

Although all species have elongated petals there is a marked variation in size, from the 3 to 4 cm. long petals of *S. nutans* and of some forms of *S. robustum* to the 5 mm. long petals of *S. sphaerocarpum*. *Stenopetalum robustum* and *S. filifolium*, both of Western Australia, have white or brightly colored yellow to orange petals, but the other six species are unusual in the family in that the petals are dully colored and range from olive-green through purplish to chocolate-brown. In all species the elongated tips are circinnately coiled in the bud. As anthesis proceeds the uncoiling of the petals forces open the sepals at the apex of the bud, al-

though they never spread widely and the calyx remains closed. In no species are the nectaries particularly well developed and the glandular tissue never completely encircles the ovary and stamens. It usually is present only around the single stamens although there is sometimes a lobe between the members of the paired stamens. This occurs occasionally in most species. Plants from the northern part of the range of *S. robustum* do show a peculiar development of the glands so that on either side of each single stamen is a flat protruding lobe of tissue. This is conspicuous both in flower and fruit and can be useful in distinguishing *S. robustum* from *S. filifolium* when the plants are only in flower. In *S. filifolium* there is development of glandular tissue above the point of insertion of the single stamens; this is shelf-like and although sometimes bilobed is never the "horseshoe" seen in *S. robustum*.

Examination with the scanning electron microscope of pollen of four species has shown it to be subglobose to ovoid, tricolpate and coarsely reticulate, the lumina large and the muri correspondingly narrow. It is hoped to examine the pollen of remaining species in the course of a more comprehensive survey of pollen types in the family.

Six species of *Stenopetalum* have been grown under greenhouse conditions, *S. nutans* at the Botanic Garden, Adelaide and *S. sphaerocarpum*, *S. velutinum*, *S. lineare*, *S. anfractum*, and *S. decipiens* at Harvard University. Of these species, all except *S. decipiens* are self-compatible, and *S. lineare* and *S. sphaerocarpum* sometimes produce cleistogamous flowers. In normal flowers, the anthers dehisce just as the uncoiling of the petals begins and at the time that the apex of the calyx has been forced open, pollen has been shed. I have seen in the field flowering plants of all species except *S. decipiens*, but I have never seen them visited by insects. The only species with scented flowers is *S. robustum*, the odor described by some as "vanilla-like," by others as "musty." Self-compatibility is advantageous to plants of an environment so inhospitable as central Australia where the capacity for seed production and dispersal from small populations or from a single plant during favorable seasons, not of regular occurrence, is of prime importance. It is true also that self-compatibility and the potential for autogamy greatly increases the chance that a species will reach suitable habitats more and more peripheral from its center of origin. In central Australia such habitats are isolated and the capacity for autogamy may be associated with the distribution of species such as *S. nutans*, *S. anfractum*, and *S. sphaerocarpum*, sparsely spread across South Australia and the Northern Territory into some very arid parts of Western Australia.

INTERSPECIFIC RELATIONSHIPS

Relationships among the species must be considered in the light both of present distribution and of post-Pleistocene climates in Australia. It is generally agreed that at some time between the late Pleistocene and the mid-Recent, Australian biota were greatly affected by the onset of

a period of severe aridity, during which the vegetation of central and south-central Australia was hard hit and, perhaps, nearly wiped out, some species retreating into southeastern Australia, others surviving in refugia in the ranges of central Australia (Crocker & Wood, 1947). This "Great Arid Period" was followed by two or three pluvial/arid (but less severely so) cycles during which there was a gradual advance of vegetation from less severely affected areas and from the refugia into present-day arid Australia.

Chromosome counts (see TABLE 1) indicate two haploid numbers, 4

TABLE 1. Chromosome Numbers of *Stenopetalum* species

SPECIES	N	2N	COLLECTION NUMBER AND LOCALITY	SELF-COMPATIBLE
<i>S. anfractum</i>		10?, 12?	<i>Shaw 654</i> Western Australia	yes
<i>S. decipiens</i>		8	<i>Nelson 1814</i> Northern Territory	no
<i>S. filifolium</i>		5 II + I *	<i>Turner 5367 *</i> Western Australia (as <i>S. croceum</i> Bunge)	
<i>S. lineare</i>	5 *	10	<i>Turner 5297 *</i> Western Australia <i>Beaglehole 20701</i> Northern Territory	yes
<i>S. sphaerocarpum</i>	5	10	<i>Shaw 664</i> Western Australia	yes
<i>S. velutinum</i>	4	8	<i>Eichler 17563</i> South Australia	yes

* Turner (1967).

and 5, in the genus. The number in *S. anfractum* probably is 5, although repeated attempts to obtain a clear figure in root tip cells were unsuccessful and the somatic count is given as questionably 10 or 12. The counts of $2n = 8$ for *S. decipiens* and *S. velutinum* do corroborate the morphological evidence which sets apart these species from the others. These two densely pubescent species, *S. velutinum* and *S. decipiens*, have a center of distribution in the central Australian ranges and the present distribution is not inconsistent with advance from a refugium in the MacDonnell—Kirchauff—George Gill system, although both species show a disjunction between south-central Queensland and the area north and west of the Simpson Desert dune systems. The annual and self-compatible *S. velutinum* is far more widely spread than is the perennial and apparently self-incompatible *S. decipiens* and is found as far south as Ooldea in South Australia and westward at least to the vicinity of Laverton in Western Australia. Another cluster of related species is formed by the

Eremaean species, *S. lineare*, *S. anfractum*, and *S. filifolium* (all probably with a base number of 5). The last species differs in having brightly colored petals and I include it here with some hesitation for the floral structure is much like that of some forms of *S. robustum*. However, these three species do have in common more or less oblong siliques on short, erect or spreading pedicels. *Stenopetalum lineare* which now is widely spread and common in central Australia is represented also in South Australia, Tasmania, and Victoria by a coastal form which may have been geographically distinct since the Recent aridity. *Stenopetalum robustum* of the Southwestern Province of Western Australia is the only species to have compressed siliques, while *S. sphaerocarpum*, although represented by populations scattered across southern Australia, is neither coastal nor truly Eremaean and differs morphologically with very small flowers and globose siliques on rigidly spreading horizontal pedicels. *Stenopetalum nutans*, a large-flowered Eremaean species with pendent obovoid siliques and malpighiaceus trichomes, also stands somewhat isolated morphologically. The discontinuities in morphology among these species and groups of species support the view that they are the remnants of a more highly developed pattern of speciation, disrupted during the arid period or periods, which cannot now be satisfactorily reconstructed.

INTERGENERIC RELATIONSHIPS

Although *Stenopetalum* is a distinctive genus, its generic relationships are even less clear than are those among the species. In Schulz's (1936) treatment of the family the genus appears as the monogeneric tribe Stenopetaleae. Schulz's diagrammatic *Stammbaum* shows the Stenopetaleae diverging from the main stock of the family just below the point at which the Hesperideae and Sisymbrieae are split off. If, in using Schulz's key to the tribes, one ignores as a diagnostic character the elongated petals of *Stenopetalum*, the genus falls between the predominantly Asian Hesperideae, characterized by flowers with erect sepals and elongated siliques with bilobed stigmas, and the very large tribe Sisymbrieae which in Schulz's treatment is a catch-all for those genera with notorrhizal embryos and more or less elongated siliques which do not clearly belong elsewhere.

The genus is basically Eremaean and thus belongs to an Australian floristic element of uncertain origin. Burbidge (1960) suggested that endemic genera among the Eremaean Cruciferae, Chenopodiaceae, Compositae, and Aizoaceae are derived from a littoral or sand dune flora present during the Cretaceous when Australia was dissected by epeiric seas, elements of which flora might have reached Australia from the northern hemisphere by migration along the shores of the Tethys Sea. In addition to weaknesses in this theory pointed out by Burbidge herself, the most recent reconstruction of Pangaea (Dietz & Holden, 1970) indicates that even by the end of the Jurassic, land breakup in the Southern Hemisphere was so far advanced that the Australian landmass was attached only to

Antarctica. Prantl (1891) had placed *Stenopetalum*, along with *Menkea*, in a subtribe of the Schizopetaleae, associated with American genera such as *Mancoa*, *Tropidocarpum*, *Matthewsia*, and *Schizopetalon*. The other subtribe, Physariinae, recognized by Prantl is entirely American including *Lesquerella*, *Physaria*, and *Synthlipsis*. Although much of Prantl's system is fantasy, part of it described by a later author as "ein phylogenetisches Unding," it may be that he was in this case nearer the truth than was Schulz. However, many of the more than 370 genera in this family are the termini of otherwise extinct evolutionary lines, a situation which makes so difficult the delimitation of tribes in the Cruciferae. In the absence of evidence to the contrary, it is best to regard *Stenopetalum*, geographically isolated in Australia, as one such endpoint, the nearest related genus being, perhaps, *Menkea*.

COMMON NAMES AND USES

Stenopetalum is of no economic significance save that in favorable seasons in central Australia some species such as *S. lineare* occur in such abundance that they become part of the diet of the aboriginal population. The central Australian species are highly flavored and quite hot and probably are used both for their nutritive value and mustardy taste. Cleland & Tindale (1954) report that seeds of *S. lineare* were eaten at Yalata on the Great Australian Bight, while Cleland & Johnston (1937) noted that in the Musgrave Ranges of South Australia *S. velutinum*, called "unmuta" by the Pitjanjara, is cooked on hot stones with grass, the leaves then stripped off and eaten. However, natives at Haast's Bluff in the Northern Territory informed Cleland & Tindale (1959) that both *S. lineare* and *S. nutans* are fit only for emus and are too strong for human consumption; *S. lineare* "makes you giddy if you try to eat it." However, it may be *S. anfractum* here referred to; both species occur at Haast's Bluff and are mixed, under the name *S. lineare*, in Cleland's collections. The name for *S. lineare*, *S. nutans*, and *S. velutinum* used by members of the Pitjanjara, Pintubi, and Aranda tribes is "unmuta," "enmerta" or something similar, although Johnston & Cleland (1942) recorded "karra garra" and "kara-kara" for *S. lineare* at Ooldea in South Australia.

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SYSTEMATIC TREATMENT

Stenopetalum R. Br. ex DC. Syst. Nat. 2: 513. 1821.

Plants erect glabrous or pubescent annuals or perennials; basal leaves, if present, pinnately divided, but often lost early in the life of the plant; cauline leaves pinnatisect or trisect or entire; inflorescences ebracteate, the buds usually ellipsoid, sometimes globose; aestivation circinnate; sepals erect (the calyx closed), the lateral saccate; petals white to orange or brown to olive-green, unguiculate, the blade elongated and often produced into a long narrow tip; stamens erect, tetradynamous; glandular tissue variable; ovules 4–20 per locule; siliques completely dehiscent and bilocular, globose, ellipsoid or (ob-)ovoid, round or compressed parallel to the septum, glabrous on the interior and exterior; septum entire; styles very short or obsolete; stigmas depressed-capitate; seeds oblong to ellipsoid and flattened, copiously mucose when moistened; embryo notorrhizal or pleurorrhizal.

TYPE SPECIES: *Stenopetalum lineare* R. Br. ex DC., Syst. Nat. 2: 513. 1821.

KEY TO THE SPECIES

- A. Plants glabrous, papillose or, if pubescent, the trichomes simple or malpighiaceus.
 - B. Pedicels erect or divaricately spreading at maturity.
 - C. Main stems clearly anfractuose; cauline leaves pinnatisect with linear segments; petals purplish or olive-green; pedicels 4–10(15) mm. long. 2. *S. anfractum*.
 - C. Main stems nearly straight; all cauline leaves entire and filiform or remotely dentate; petals bright yellow-orange; pedicels 3–4 mm. long. 3. *S. filifolium*.
 - B. Pedicels recurved or horizontally spreading at maturity.
 - D. Siliques globose or obovoid, round; petals greenish or brownish.
 - E. Pedicels 3–8 mm. long and stout, usually horizontally spreading; plants glabrous or papillose; siliques globose. 4. *S. sphaerocarpum*.
 - E. Pedicels 8–15(20) mm. long and slender, recurved; plants pubescent with malpighiaceus trichomes; siliques obovoid. 5. *S. nutans*.
 - D. Siliques orbicular to ellipsoid or obovoid, compressed parallel to the septum; petals white, yellow or orange. 6. *S. robustum*.
- A. Plants pubescent with irregularly branched or stellate trichomes.
 - F. All parts, including leaves, densely pubescent; all leaves entire or remotely dentate; sepals with gibbous thickening at the tip.
 - G. Plants annual; ovules 10–20 per locule; siliques 4–7 mm. long, seeds tuberculate. 8. *S. velutinum*.
 - G. Plants perennial, woody at the base; ovules 3–10 per locule; siliques 7–11 mm. long; seeds smooth. 7. *S. decipiens*.
 - F. Upper parts of plant glabrous or sparsely pubescent; lower cauline leaves pinnatisect to trisect; sepals not thickened at the tip. 1. *S. lineare*.

1. *Stenopetalum lineare* R. Br. ex DC. Syst. Nat. 2: 513. 1821.

MAP 1.

HOLOTYPE. Victoria? Hab. in orâ australi Novae-Hollandiae, *R. Brown* (G-DC); isotypes? (BM, E, MEL, P).

S. lineare var. *canescens* Bentham, Flora Austral. 1: 78. 1863. Holotype. Victoria. Port Phillip, *F. Mueller* (K).

Plants annuals or, in coastal sites, often perennial, subglabrous to densely pubescent; trichomes sessile or shortly stipitate, stellate or irregularly branched, densest toward the base of the stems; stems to at least 5 dm. high, but the height most variable, usually branched, erect or, especially in coastal plants, sometimes decumbent with erect laterals; basal leaves usually less than 5 cm. long, exceptionally to 10 cm., pinnatipartite with linear to narrowly obovate segments, these sometimes finely dentate or, in coastal plants, often entire; cauline leaves to 6 or 7 cm. long, exceptionally to 10 cm., generally pinnatisect or trisect, the uppermost sometimes entire and filiform; inflorescences rather loose, elongating before anthesis, the buds obovoid or ellipsoid; sepals 3–6 mm. long, elliptic-oblong to narrowly obovate, the lateral strongly saccate at the base; petals (4)6–13 mm. long, chocolate-brown to olive-green, the linear claw expanded into an oblong blade roughly U-shaped around the single stamens (open on the outer side); infructescences loose and elongated (to 30 cm.); pedicels less than 5 mm. long, usually nearly erect, rarely horizontally spreading or even reflexed; siliques 3.5–7.5 mm. long, oblong and terete; stigmas capitate and slightly elongated; ovules 8–14(18) per locule; seeds 0.8–1.5 mm. long, oval to oblong and compressed, the testa red- or orange-brown, smooth. $n = 5$, $2n = 10$.

DISTRIBUTION. Widely spread in the interior of southern Australia, but also found in Tasmania and on the coasts of South Australia and Victoria.

Queensland. Gilruth Plains, Cunnamulla, *Allen 626, 666* (CANB); Nockatunga Station, *Blake 11820* (BRI); Birdsville, *Blake 12211* (BRI). New South Wales. Milparinka, *Collier* in 1910 (NSW). Wilcannia, *Kennedy* in 1885 (MEL); West Wyalong, *Ingram* in 1958 (NE); Broken Hill, *Morris 2332* (BRI, K); Balranald, *Lucas* in 1878 (MEL). Victoria. Kulkyne National Park, *Beaglehole 1137* (MEL); East Whipstick near Bendigo, *Robbins* in 1948 (MEL); Werribee, *Fullager* (MEL); Murrayville, *Williamson* in 1928 (E); Mt. Arapiles, *Hicks* in 1960 (AD). Tasmania. Bellerive, *Lucas* in 1923 (NSW); Ralph's Bay, *Comber 1611* (E, K); R. Jordan, *Rodway* in 1898 (NSW). South Australia. 17 miles north of Mt. Gason bore, *Lothian 355* (AD); Frome River, 2 km. north of Marree, *Shaw 191* (AD); Koonamore, *Osborn* in 1928 (SYD); 26 km. south The Gums H. S., *Shaw 175* (AD); Port Noarlunga, *Griffith* in 1912 (AD); Beachport, *Tate* in 1882 (AD); Ross River near Ludgate's Well, *Shaw 492* (AD); 11 km. north of Mable Creek, *Shaw 522* (AD); Wudinna, *Ising* in 1938 (AD); Bitter Well, Coomaba, *Cleland* in 1929 (AD); between Tomkinson and Mann Ranges, *Cleland* in 1954 (AD); Fowler's Bay, *Richards* (AD, MEL). Northern Territory. 35.9 miles

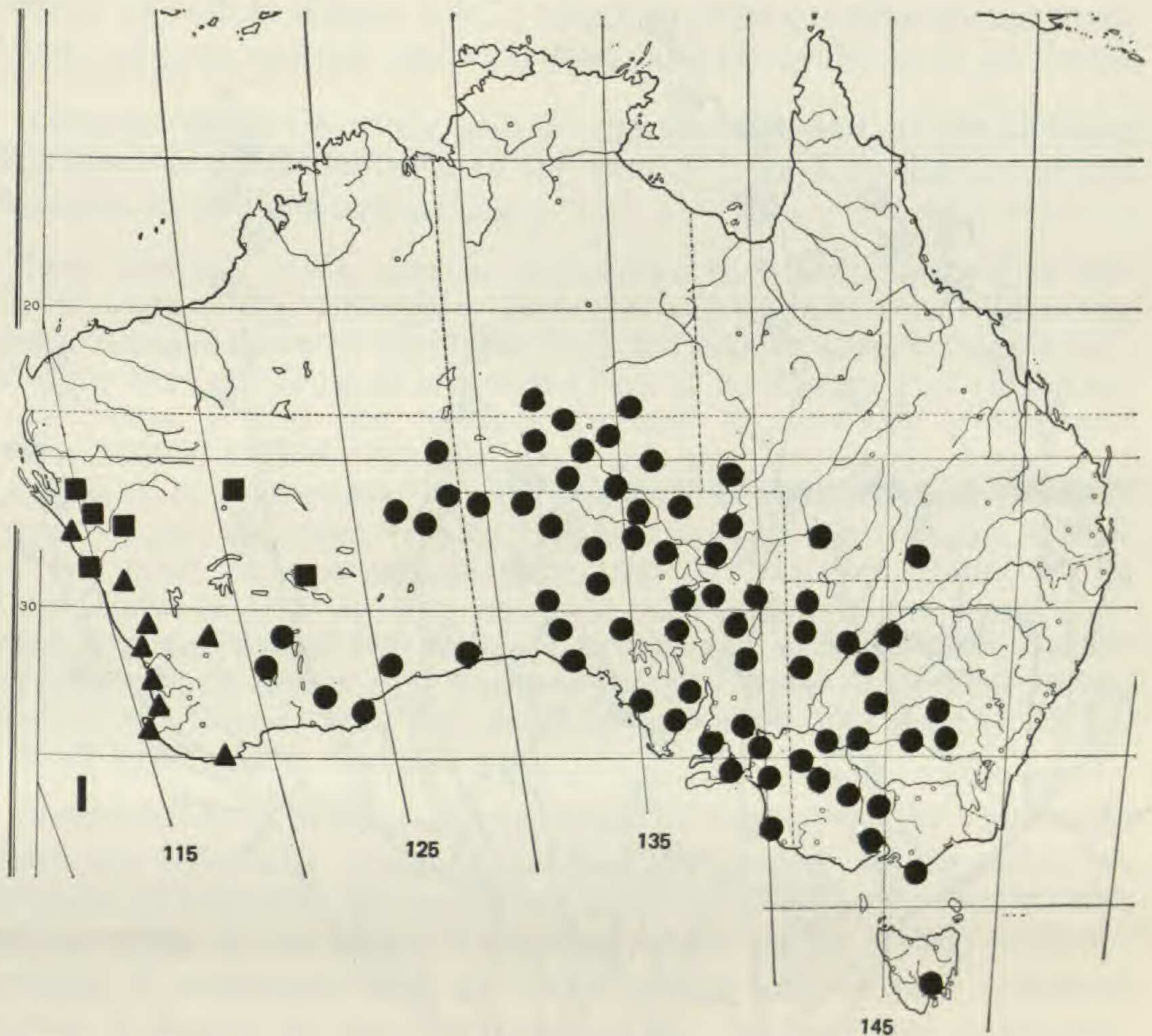
s. w. Tobermory H. S., *Chippendale* (NT); Atnarpa Station, *Beaglehole* 20701 (MEL); 3 km. north of Charlotte Waters, *Shaw* 483 (A, AD); Haast's Bluff Reserve, *Cleland* in 1957 (AD); 40 km. west of Erldunda, *Cleland* in 1935 (AD). **Western Australia.** 5 miles south of Giles, *Kuchel* 191 (AD); 3 km. north of Old Eucla, *Wilson* 1647 (AD); Kalgoorlie, 5 miles along Coolgardie Road, *Burbidge* 1875 (BRI, CANB); Israelite Bay, *Brooke* in 1885 (MEL); Stirling Range, *Morrison* in 1902 (K).

The type locality probably is Port Phillip Bay, visited by Brown in April, 1802, and that is the locality given on those specimens cited as possible isotypes. However, there is in the herbarium of the British Museum (Natural History) a specimen, labelled "Bass Strait" which may have been collected in the Kent Group by Brown during his stay following Flinders' departure.

Stenopetalum lineare is both the most common and the most widely spread species in the genus and is the only one known from Tasmania. Although in inland parts of Australia this species is always an herbaceous annual, plants from coastal parts of South Australia, Victoria, and Tasmania often are woody, the main stems decumbent with erect laterals, and perennial. Bentham's var. *canescens*, described as "A low branching more robust form, the young shoots slightly hoary with a minute stellate pubescence, and the leaves rather thicker," is based upon a typical plant of the coastal form, woody at the base and with the leaves mostly entire and probably quite fleshy. Although De Candolle described *Stenopetalum* (*S. lineare*) as glabrous, I have never seen plants which are completely without trichomes. The density of pubescence is, however, quite variable and older plants may have trichomes only in the leaf axils. The original (and incorrect) description of *S. lineare* as glabrous led Bentham to describe, in fact, to re-describe, the littoral form as var. *canescens*, a name which has been wrongly applied to plants from the interior, the result being confusion of *S. velutinum* with *S. lineare*.

From Tasmania and the mainland coast toward the interior can be seen a gradual change in fruit shape. Plants of the coastal form have narrow cylindrical fruit; the average ratio of silique length to width (across the replum) in the Tasmanian plants I have seen is 4.7:1. In the interior, *S. lineare* has fruit more nearly ellipsoid. The average ratio of length to width is 3.0:1 in plants of the Flinders Range and Olary Spur in South Australia and 2.4:1 in plants from the Lake Eyre basin. These plants have seeds which are larger and exude mucus more rapidly than do those of coastal plants.

To a plant of *S. lineare* goes the distinction of having been the first plant collected in Australia by Ferdinand Mueller. Mueller landed at Port Adelaide early in December, 1847 and the plant (MEL 10781) is labelled in his hand, "In poeinsulae Levevre oris [Port Adelaide]/Dec. 1847/F. Mueller/prima fecit planta a me in terra Australasia collecta; ex hac causa nomen triviale 'gratulatorium' adposis." Although Mueller often used the name "*Stenopetalum gratulatorium*" (or *gratulorum*) on labels, it was never published.



MAP 1. *Stenopetalum lineare* (dots); *S. robustum* var. *robustum* (triangles), var. *pedicellare* (squares).

2. *Stenopetalum anfractum* E. Shaw, sp. nov. FIGURE 1; MAP 4.

Plantae annuae, glabrae vel sparse papillosae; caules rigiduli et multum ramosi, caulo principali anfractuoso-flexuoso; folia caulinea pinnatisecta; petala olivacea vel obscure purpurea, lamina longe et anguste producta; pedicelli fructiferi brevissimi crassique; siliquae oblongae vel ellipsoideae, teretes; ovulae 8–15 in loculo. $2n = 10?$ vel $12?$

HOLOTYPE. South Australia. Ca. 25 km. west of Welbourne Hill, *Whibley* 927 (AD), isotype (GH).

Plants slender annuals, glabrous or sparsely papillose; stems 1–4 dm. long, rigid, usually much branched and thus anfractuose, terete to sharply angled; basal leaves rosulate and apparently similar to the cauline leaves, but rarely present on flowering or fruiting plants; cauline leaves 1–6 cm. long, pinnatisect with 1 to 3 narrow and nearly linear lobes per side, the upper leaves sometimes entire and filiform; inflorescences rather loose and few-flowered, the buds ellipsoid; sepals 3.5–5.5 mm. long, oblong to narrowly obovate, not saccate; petals 8–13 mm. long, olive-green to

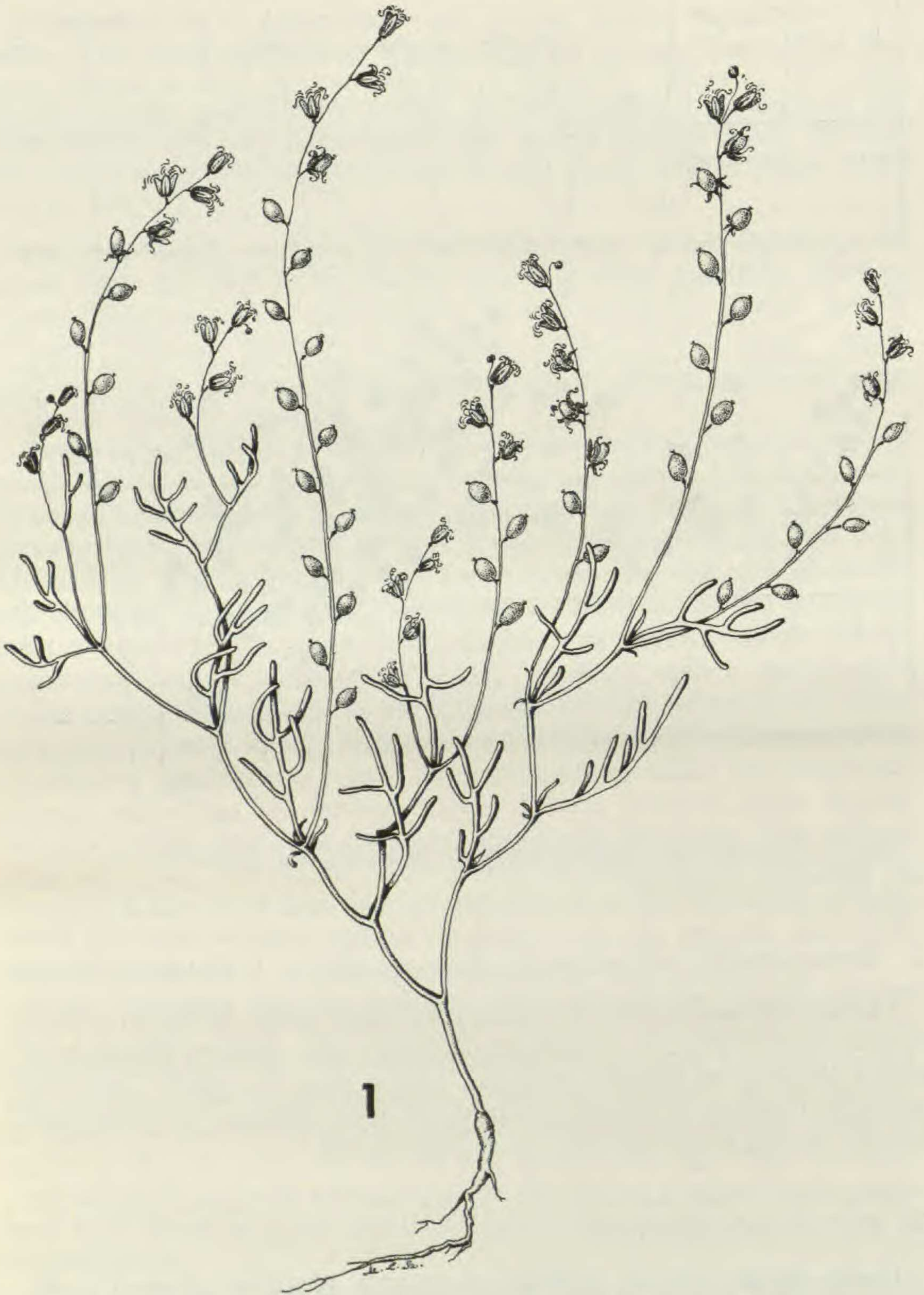


FIGURE 1. *Stenopetalum anfractum*. Habit, $\times 1/2$.

purplish, the claw narrow but expanded into the suborbicular to elliptic blade, this elongated into a narrow tip more than half the total length of the petal; stamens 2.5–4 mm. long; glandular tissue \pm square around the single stamens and subtending the adjacent paired stamens; infructescences loose, the pedicels 4–10(15) mm. long, short and stout, appressed or

slightly spreading; siliques 4–6(7) mm. long, oblong to ellipsoid and nearly terete; stigmas capitate and sometimes bilobed; ovules 8–15 per locule.

DISTRIBUTION. On sandy soils in the southern part of the Northern Territory, in South Australia to the west of Lake Eyre, and in western Australia to the longitude of Cue.

South Australia. 34 km. north of Old Lambina H. S. ruins, *Shaw 447* (A, AD); 22 km. south of Mt. Willoughby, *Shaw 516* (AD); 26 miles north of Woorong Creek, *Beaglehole 20167* (MEL); De Rose Hill Station, *Lothian 858a/54* (AD); Wild Cat Bore, 25 km. s. w. of Everard Park H. S., *Whibley 1119* (AD); Ernabella, *Cleland* in 1933 (AD). **Northern Territory.** 32 miles n. e. of McDonald Downs Station, *Lazarides 5925* (AD, CANB, MEL, NSW, NT, PERTH); 5 miles e. of Coniston H. S., *Chippendale* (AD, NT); 35 miles s. w. of Alice Springs Township, *Perry 5477* (AD, BRI, CANB, NT); the "Pudding" area, Mt. Olga complex, *Schodde 435* (AD, CANB). **Western Australia.** Giles, *Hill 1377* (AD); Mt. Squires, Barrow Range, *Helms* in 1891 (AD, MEL, NSW); 22 miles west of Browne Range, Gunbarrel Highway, *George 5408* (PERTH); 80 miles east of Meekatharra, *Gardner 7874* (PERTH); 50 miles s. e. of Gascoyne Junction, *Turner 5382c* (TEX); 48 km. south of Mt. Magnet, *Shaw 648* (AD); Cue, *Andrews* in 1903 (PERTH); 67 km. s. w. of Payne's Find, *Shaw 663* (AD).

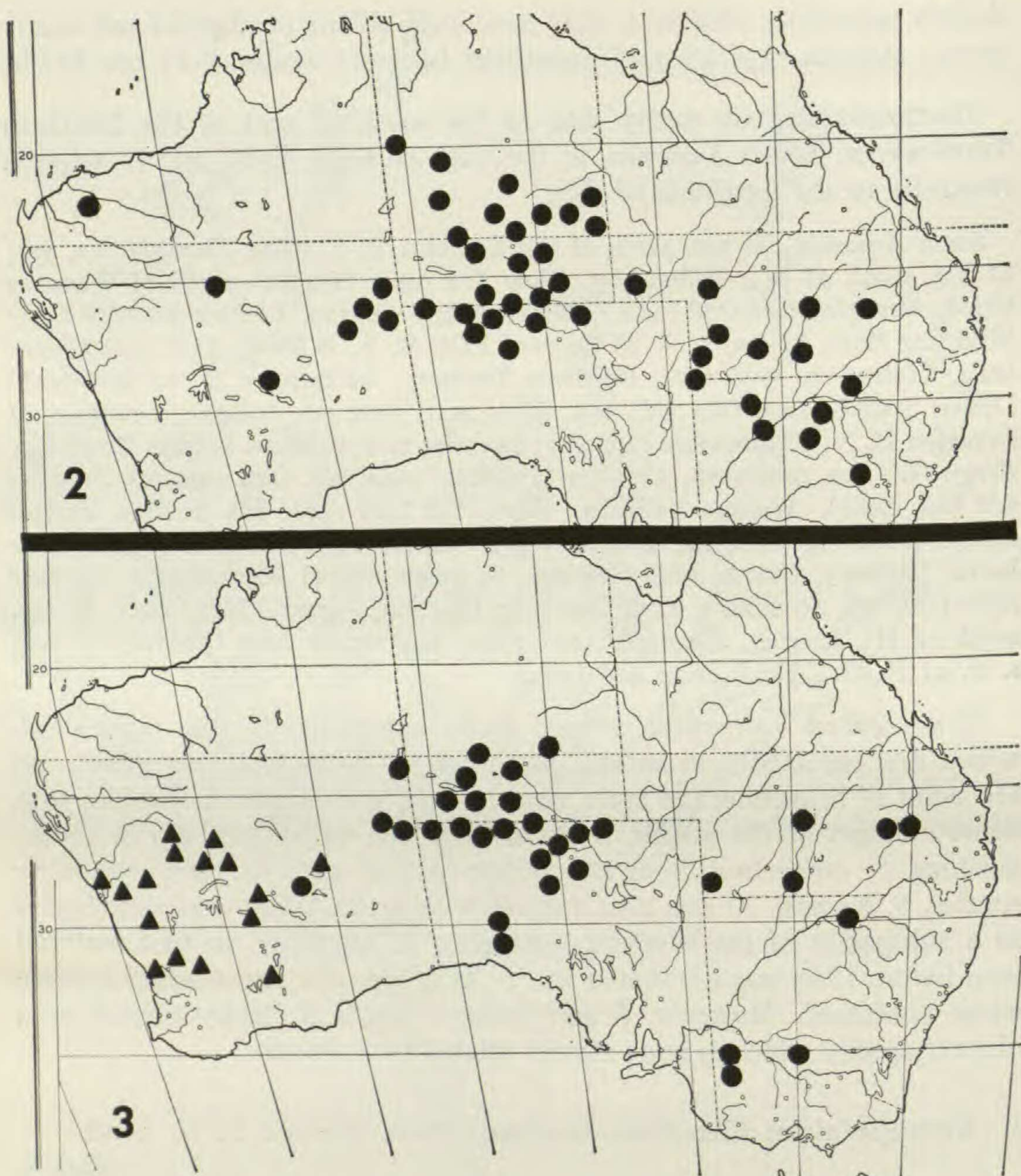
Stenopetalum anfractum is most easily recognized by the rigid stems which are repeatedly branched, producing a distinct zig-zag effect. At the point of branching the main stem is usually D-shaped in section, with definite ridges at the angles, a character which can be of help in distinguishing *S. anfractum* from the rather similar and, in part, sympatric species, *S. lineare*. At one time I thought that this taxon was best treated as a subspecies of the Western Australian *S. filifolium*, so that material seen before 1968 was annotated as "*S. filifolium* ssp. *anfractum*," a name never published. However, I now believe that it is better treated as a distinct species which is most closely related to *S. lineare*.

3. *Stenopetalum filifolium* Bentham, *Flora Austral.* 1: 78. 1863.

MAP 3.

HOLOTYPE. Western Australia. Swan River, *Drummond s.n.* (K).

Plants slender annuals, glabrous or sparsely pubescent; trichomes when present, usually at the base of the stems, simple, short and more or less crinkled; stems to 40 or 50 cm. high, erect and often very fine, sometimes quite elaborately branched; basal leaves unknown; cauline leaves 1–4(7) cm. long, 1–3(5) mm. wide, rather few and scattered, entire and often filiform, rarely remotely dentate; inflorescences loose, the flowering pedicels very short and the flowers apparently sessile, buds ellipsoid; sepals 3.5–4.5 mm. long, elliptic to oblong, the lateral saccate; petals 10–15 mm. long, bright yellow-orange, the claw linear and expanded into an oblong blade, this drawn out into an acuminate tip; stamens 2.5–3.5 mm. long; glandular tissue forming a narrow shelf on the inner side of each single stamen; infructescences usually loose, but variable; pedicels



MAP 2. *Stenopetalum nutans*. MAP 3. *Stenopetalum velutinum* (dots); *S. filifolium* (triangles).

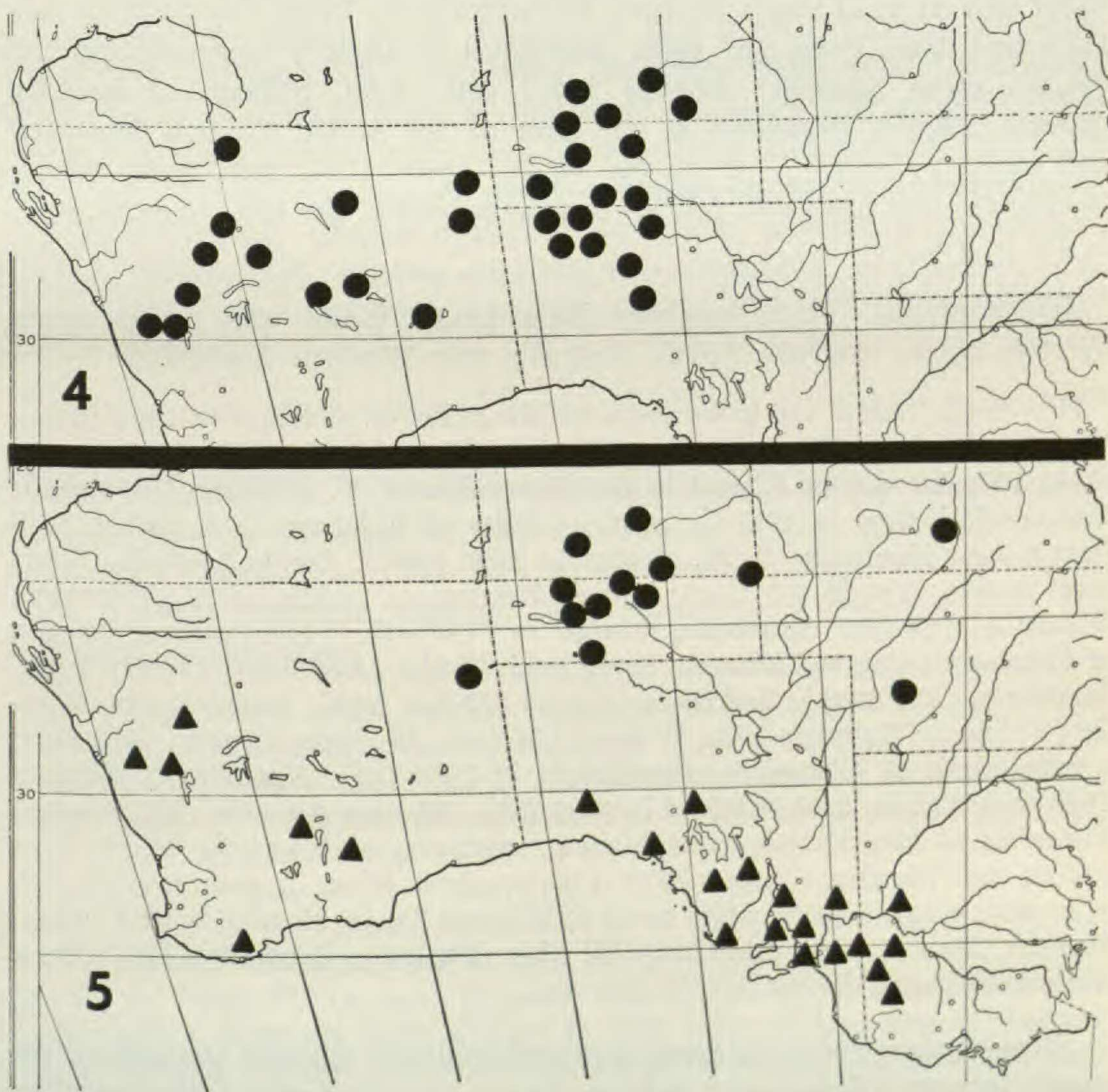
3–4 mm. long, stout and usually spreading from the axis; siliques 4.5–6 mm. long, ellipsoid and slightly compressed or terete; stigmas bilobed; ovules 6–10 per locule; well developed seeds not seen. $2n = 5 \text{ II} + \text{I}$.

DISTRIBUTION. Western Australia, in the districts of Austin, Coolgardie, Irwin, Avon, and Darling.

Western Australia. Lake Violet Station, 75 miles e. of Wiluna, *Bennett 71* (PERTH); 8 miles south of Menzies, *George 2724* (PERTH); Pioneer, *Davies 269* (PERTH); 5 miles west of Meekatharra, *Speck 579* (CANB, PERTH); 107 miles north of Mullewa, *Turner 5367* (TEX); Yalgoo, *Gardner 7756* (PERTH); 18 miles s. w. of Warriedar H. S., *Shaw 666* (AD); Merridin, *Koch 2845* (K, NSW); 77

miles north of Geraldton, *Shaw 617* (AD); Northampton, *Maiden* in 1909 (NSW); near Smith's Mill, 20 miles e. of Perth, *Andrews* in 1902 (NSW).

Stenopetalum filifolium is an attractive little plant which seems to be quite widely spread in the southern half of Western Australia. The known range overlaps, in part, those of several other species of *Stenopetalum*, but the only one with which this species might be confused is *S. anfractum*. *Stenopetalum anfractum* has leaves usually at least trisect and petals of a dull brownish or purplish color, while *S. filifolium* has narrow entire leaves and petals which are a bright, clear orange-yellow. I have collected *S. filifolium* near the Murchison River Crossing on the Northwestern Coastal Highway and at several places southwest of Mt. Magnet. In the latter area it often occurs with *S. anfractum*, but the two species could always be easily distinguished.



MAP 4. *Stenopetalum anfractum*. MAP 5. *Stenopetalum decipiens* (dots); *S. sphaerocarpum* (triangles).

4. *Stenopetalum sphaerocarpum* F. Muell. Hook. Lond. Jour. Bot. 8:
5. 1850. MAP 5.

LECTOTYPE. South Australia. Towards the entrance of the Murray River, *F. Mueller* in 1848 (MEL 10847).

Plants slender annuals, glabrous or sparsely papillose; stems 1–3 dm. long, often straggling, and wiry and leafless when in fruit; basal leaves to 5 cm. long, pinnatifid with 2 or 3 lobes per side, narrowing gradually to the slender petiole; cauline leaves 0.5–4 cm. long, few and scattered, entire, usually trifid with the central lobe slightly longer than the laterals, tapering to a slender petiole; inflorescences few-flowered and elongate, the buds ellipsoid; sepals 2–2.5 mm. long, oblong or obovate to elliptic, the lateral ones markedly saccate; petals 3.5–6 mm. long, 0.6–1 mm. wide, olive-green or purplish, the claw suddenly expanded into the round or elliptic blade, this drawn out into a slender tip; stamens 2–2.5 mm. long; glandular tissue poorly developed, consisting of 1 or 2 small lobes on either side of each single stamen; infructescences loose, the pedicels 3–7 (11) mm. long, stout and rigid, horizontal or slightly recurved and the siliques often pendent; siliques 3–5.5 mm. long, globose or broadly obovate, slightly depressed at the base of the style; stigmas depressed and capitate; ovules (4)6–10 per locule; seeds 1.5–2 mm. long, oblong to ellipsoid and flattened, yellow- or orange-brown, the testa smooth. $n = 5$, $2n = 10$.

DISTRIBUTION. From southern New South Wales and northwestern Victoria across southern South Australia into Western Australia.

New South Wales. 120 miles south of Menindee, *G. J. White* in 1963 (NSW). **Victoria.** Lendrook Plain, Kulkyne National Park, *Beaglehole* 5283 (MEL); about 10 miles east of Kiamal in the Ouyen district, *T. B. Muir* 1106 (MEL); Underbool, *Malone* in 1915 (A, NSW); vicinity of Rainbow, *C. S. Sutton* 1633 (MEL); near Dimboola, *F. M. Reader* in 1898 (MEL). **South Australia.** Cane-grass Station, *Ising* in 1937 (AD); Kringin Reserve, ca. 32 km. north of Pinnaroo, *Wilson* in 1961 (AD); Karoonda, *Winkler* in 1934 (AD); 5 km. north of junction of Chauncey's Line and Monarto South road, *Eichler* 15097 (AD); Crystal Brook, *Mueller* in 1851 (MEL); Ardrossan, *Tepper* 292 (AD, MEL); Port Lincoln, *Mueller* [?] (MEL); Cunyarie Hills, *Wilson* 1884 (AD); Wudinna, *Ising* in 1938 (AD); 8 miles north of Kingoonya, *Beaglehole* in 1968 (AD); Koonibba, *Cleland* in 1928 (AD); Ooldea Soak, *Cleland* in 1939 (AD). **Western Australia.** Mt. Magnet, *Fitzgerald* in 1903 (NSW); Lake Monger, southwest of Warriedar H. S., *Shaw* 664 (A, AD); Morawa, *Gardner* 7518 (PERTH); Swan River, *Drummond* 687 (BM, E, K, MEL, P, W); basaltic ridges north of Stirlings Range, *Mueller* in 1851 (MEL); Boulder, *Staer* in 1905 (E); Camp 54, Elder Exploring Expedition [80 miles s. Victoria Springs], *Helms* in 1891 (AD, MEL).

Stenopetalum sphaerocarpum is morphologically uniform throughout the range, the small flowers and globose siliques on rigid horizontally spreading pedicels at once distinguishing this from other species of *Stenopetalum*. The flowers are the smallest of any species in this genus, for the petals although always drawn out into the characteristic elongated tip are no more than 6 mm. long. This species and *S. lineare* are the only species of *Stenopetalum* known from Victoria and southern South Australia.

5. *Stenopetalum nutans* F. Muell. *Fragm. Phytogr. Austral.* 3: 27. 1862. MAP 2.

HOLOTYPE. Queensland. Between Stokes Range and Coopers Creek, *F. Wheeler* (MEL 10789).

Plants annual or, under favorable conditions, biennial, sparsely pubescent; trichomes malpighiaceus; stems usually to 3 dm., exceptionally to 5 dm. high, single to several, erect or decumbent and often much branched; basal leaves to about 6 cm. long, entire to remotely dentate or pinnatifid, narrowing to a slender petiole about as long as the blade; cauline leaves 3–9 cm. long, 4–12 mm. wide, linear to narrowly elliptic, entire or dentate toward the base; inflorescences loose and few-flowered, the buds obovoid or ellipsoid and purplish at the tip; petals 15–40 mm. long, the blade 0.8–1.5 mm. wide, yellowish green or brown, the claw 2 to 3 mm. long, expanded into an elliptic blade drawn out into a long, slender and often twisted tip; stamens 3–5.5 mm. long; glandular tissue poorly developed, consisting of a bilobed piece of tissue on the inner side of each single stamen; infructescences loose and often secund, the pedicels 7–12(17) mm. long, at maturity recurved and the siliques nutant, occasionally horizontally spreading; siliques 6–10(13) mm. long, obovoid and sometimes slightly compressed; stigmas capitate and depressed; ovules 6–12 per locule; seeds 1.5–2 mm. long, reniform, orange-brown, the testa tuberculate or verrucose.

DISTRIBUTION. *Stenopetalum nutans* is widely spread across central Australia, from Roma, Queensland, in the east to the Hamersley Range in Western Australia. It is common in the southern half of the Northern Territory and in the adjacent part of South Australia, especially to the northwest of Lake Eyre. The area encompassed by the scattered records from Western Australia suggests that *S. nutans* is widespread in the Eremaean of that state.

Queensland. Roma, *anon.* (MEL); Charleville, *Clemens* in 1945 (BRI); "Gilruth Plains," Cunnamulla, *Allen* 2420 (CANB); Tenham Station, 25 miles s.s.e. Windorah, *S. T. Blake* 12032 (BRI); Thargomindah, *Conacher* in 1931 (NSW); east of Camp 22 [Simpson Desert Expedition], *Crocker* in 1939 (AD). New South Wales. Lighting Ridge, *Constable* in 1951 (NSW); Muginoble, 5 miles s.e. Parkes, *Constable* in 1947 (NSW); near Gongolgon, *Beadle* in 1941 (SYD); Cobar, *Beadle* in 1940 (SYD); 45 miles s.w. of Wanaaring, *Chislett* 6 (NSW). South Australia. Abminga, *Ising* in 1933 (AD); 11 km. southeast of new Lambina H. S., *Shaw* 437 (A, AD); 18 miles west of Welbourne Hill, *Beaglehole* 22745 (MEL); Kenmore Park, *Cleland* in 1950 (AD); 15 km. west of Everard Park homestead, *Eichler* 17422 (AD); N. Musgrave Ranges, *Basedow* 257 (AD, K, NSW); Piltardi, *Wilson* 2536 (AD). Northern Territory. 3 miles west of Argadargada H. S., *Swinbourne* 570 (NT); Tarlton Downs, *Mathew* in 1955 (AD, CANB, BRI, MEL, NSW, NT); 3 km. north of Charlotte Waters, *Shaw* 482 (AD); 17 miles east of Harts Range Police Depot, *Lazarides* 5207 (AD, CANB, MEL, NSW, NT, PERTH); 5 miles south Taylor River Crossing, Stuart Highway, *Nelson* 1250 (AD, NT); 40 miles south Aileron Township, *Perry* 5366 (AD, BRI, CANB, MEL, NSW,

NT, PERTH); Rodinga, *Ising* in 1936 (AD); Tanami area, *A. W. Barks* in 1948 (NT); Mt. Doreen, *Paige & Turner* in 1964 (NT); George Gill Range at junction with Levi Range, *Beauglehole* 27130 (MEL); Mulga Park H. S., *George* 5131 (PERTH). Western Australia. Giles Settlement, *Hill* 1385 (AD); 68 miles s.w. of Warburton Mission, *George* 8158 (AD, GH, PERTH); Hamersley Range, *McMillan* in 1958 (PERTH); 38 miles n.e. Meekatharra, *Speck* 1137 (CANB, PERTH); Glenorn Station, Malcolm, *Burbidge* in 1938 (PERTH).

Stenopetalum nutans, with large pendent siliques and long green petals, these with twisted tips, is the most distinctive species of the genus, immediately attracting one's attention in the field.

6. *Stenopetalum robustum* Endl. Enum. Pl. Hugel. 4. 1837.

Plants annuals, papillose or subglabrous, variable in size and habit; stems (of fruiting plants) 3 cm. to 1 m. long, short and robust or loose, straggling, and much branched; basal leaves to 4(8) cm. long, entire to deeply pinnatisect, usually lost early; cauline leaves to 3(6) cm. long, few and scattered, entire and linear or oblanceolate or coarsely lobed or dentate; inflorescences few-flowered and (in southern plants) often subumbellate, toward the northern part of the range, laxer; sepals 2.5–5 mm. long, elliptic-oblong to obovate, the laterals markedly saccate, all gibbous at the tip; petals 6.5–20 mm. long, variable (see discussion); stamens 2.5–5 mm. long, the anthers sometimes with a small appendage at the base of each cell; glandular tissue white to reddish, consisting of a protuberant lobe on each side of each single stamen; infructescences loose; pedicels 2–4(6) mm. long, usually recurved [7–20 mm. long in var. *pedicellare*]; siliques (4.5)5.5–9 mm. long, elliptic to suborbicular or obovoid and compressed; stigmas obscurely bilobed; ovules 6–12 per locule; seeds about 2 mm. long, oblong to suborbicular and flattened, reddish-brown.

KEY TO THE VARIETIES

- Pedicels 2–4 mm., exceptionally to 6 mm. long. var. *robustum*.
 Pedicels 7–20 mm. long, and very slender. var. *pedicellare*.

6a. *Stenopetalum robustum* var. *robustum*.

MAP 1.

HOLOTYPE. Western Australia. King George's Sound, *Hügel* (w).

S. croceum Bunge in Lehmann, *Plantae Preissianae* 1: 258. 1844–45. Holotype. Western Australia. "In arenosis sylvae haud longe ab oppidulo Perth," *Preiss* 1939 (P), isotypes (MEL, P, W).

S. gracile Bunge, Lehmann, *Plantae Preissianae* 1: 257. 1844–45. Holotype. Western Australia. "In arenosis umbrosis vallis haud longe ab ora maritima Perth," *Preiss* 1938 (P), isotypes (MEL, P, W).

S. robustum var. *gracile* (Bunge) Ostenf. Kgl. Danske Vidensk. Selsk. Biol. Medd. 3(2): 65. 1921.

S. minus Bunge, Lehmann, *Plantae Preissianae* 1: 258. 1844–45. Holotype.

Western Australia. "Ad Princess Royal Harbour," *Preiss 1936* (P), isotypes (MEL).

S. album E. Pritzel, Feddes Repert. 10: 133. 1911. Holotype. Western Australia. "In partibus australibus prope oppidulum Busselton, haud procul ab ora marina," *Max Koch 1969* (B), isotypes (MEL, NSW).

Western Australia. Murchison's River, *anon.* (MEL); Yandanooka, *A. Morrison* in 1904 (E); Nungarin, *Stoward 343* (BM); Moora, *Ashby 159* (AD, PERTH); 2 miles east of Forrestdale, *George 3039* (PERTH); 4 km. west of the Mandurah Road on the road to White Hill, *Shaw 710* (AD); Bunbury, *E. Ashby* in 1930 (AD, BM); Busselton, *Lucas* in 1928 (NSW); on limestone outcrops below the Cape Naturaliste lighthouse, *Shaw 702* (AD); 1.5 km. east of Hamelin Bay, *Shaw 688* (AD); (Lake Muir), Tourbay [Torbay, near Albany], *Mueller* (MEL).

Stenopetalum robustum is, as the synonymy suggests, the most variable species of the genus. The most conspicuous variation, that responsible for the several synonyms, is in the petals — in their color, in the absolute length, and in the relative lengths of the blade and its acuminate tip. Plants from the southernmost localities, such as the type of *S. robustum* from King George Sound, and those in the vicinity of Cape Leeuwin and Augusta have white or cream-colored petals with short and rather broad tips which are about 1 to 3 times the blade in length, or have petals which show no clear demarkation between blade and tip and are trullate. At the other extreme are the populations occurring northward from the vicinity of Mandurah (about 50 miles south of Perth). These plants have yellow to deep orange petals with very long and slender tips which may be 10 times or more the blade in length. Between the extremes occur all intermediates. A sample taken near Cape Naturaliste included plants with the short white petals of the type, plants with longer (but white) petals, plants with longer petals (only the tips orange or yellow), and some with petals entirely yellow or orange, but the tips not so long as those seen on plants growing north of Mandurah.

Plants from the southern part of the range — those with short white petals — tend to be shorter and more robust, and to have denser inflorescences, and this is generally true of those in coastal areas. Those growing inland and north of Perth, are usually large and more branched. Some plants in a collection made near Yanchep (*Shaw 529*, AD, GH) were 1 meter in height and very loose and straggling. Also noticeable in proceeding from Cape Leeuwin northward is a gradual increase in laxness of inflorescences and infructescences. Plants with compact, but slightly elongated inflorescences, look remarkably like flowering plants of *Stackhousia*.

The holotype of *S. robustum*, collected by Hügel at King George Sound (Albany, on the south coast of Western Australia) has short white petals, described by Endlicher as "Petala sepalis duplo longiora, . . ." that is, about 2 1/2 lines long. The next collections, those of Preiss, were made at Princess Royal Harbour, the western arm of King George Sound (*Preiss 1936*), and near Perth (*Preiss 1938, 1939*). From these three collections Bunge described three species of *Stenopetalum*. That from Princess Royal

Harbour is *S. minus* described as having "petalis sepala duplo superantibus (croceis) . . ." and "Caules . . . florentes 3-4 pollicares." This is rather depauperate material of the form collected by Hügel and the reference to the petals as yellow may have been a misinterpretation of dried material. Oddly enough, Bunge made no outright comparison of this "species" with *S. robustum* and he may not have realized that the localities are essentially the same. The two collections made near Perth became the types of *S. gracile* and *S. croceum*. The former is based on white-flowered plants, the petals described as ". . . sepala 3plo superantibus (albis), . . ." and as 6 lines in length. *Stenopetalum croceum* Bunge described as having petals ". . . sepala quadroplo superantibus (croceis) . . ." and 8 lines long with a long slender tip. Comments in the protologues of these three do show that Bunge understood that the plants before him were closely related to Endlicher's species and Bunge cannot be faulted for his failure to realize that the isolated collections from Perth and Albany do belong to a single species. A fifth name belonging here is *S. album* E. Pritzel, based on a collection from Busselton on Geographe Bay. The type is quite ordinary white-flowered material much like the type of *S. robustum*.

6b. *Stenopetalum robustum* var. *pedicellare* (F. Muell. ex Benth.)
E. Shaw, comb. nov. MAP 1.

S. pedicellare F. Muell. ex Bentham, *Flora Austral.* 1: 79. 1863. Holotype. Western Australia. Murchison River, *Oldfield* (K).

Western Australia. 45 miles s.e. of Carnarvon, *Beaglehole 11754* (MEL); between Carnarvon and Shark Bay, *Berston* in 1962 (PERTH); 103 miles s.e. of Carnarvon, *Beaglehole 11783* (MEL); Lake Violet, *Speck 1301* (AD, CANB, PERTH); Twin Peaks Station, *Royce 5721* (PERTH); Champion Bay [Geraldton], *Gray 54* (MEL); Yandanooka, *Morrison* in 1904 (E); Glenorn Station, Malcolm, *Burbidge* in 1938 (PERTH).

Although described by Bentham as a distinct species, these slender plants differ from the northern form of var. *robustum* only by the more straggling habit and very long pedicels. The petals, described by Bentham as "apparently yellow" are a bright orange-yellow, much as in *S. filifolium*.

7. *Stenopetalum decipiens* E. Shaw, sp. nov. FIGURE 2, MAP 5.

Plantae perennes, suffruticosae, saepe ramosissimae, dense pubescentes trichomatibus ramosis, his in tomento coacto implexis; petala liguliformes hepatica vel olivacea; infructescentiae laxae, pedicellis divaricatis; siliquae ellipsoidea vel anguste obovatae; ovulae 5-10 in loculo; semina laeves porphyrea vel obscure aurantia. $2n = 8$.

HOLOTYPE. Northern Territory. 44 miles w.n.w. of Hartz Range Police Station, *Lazarides 5889* (AD), isotypes (BRI, CANB, MEL, NSW, NT).

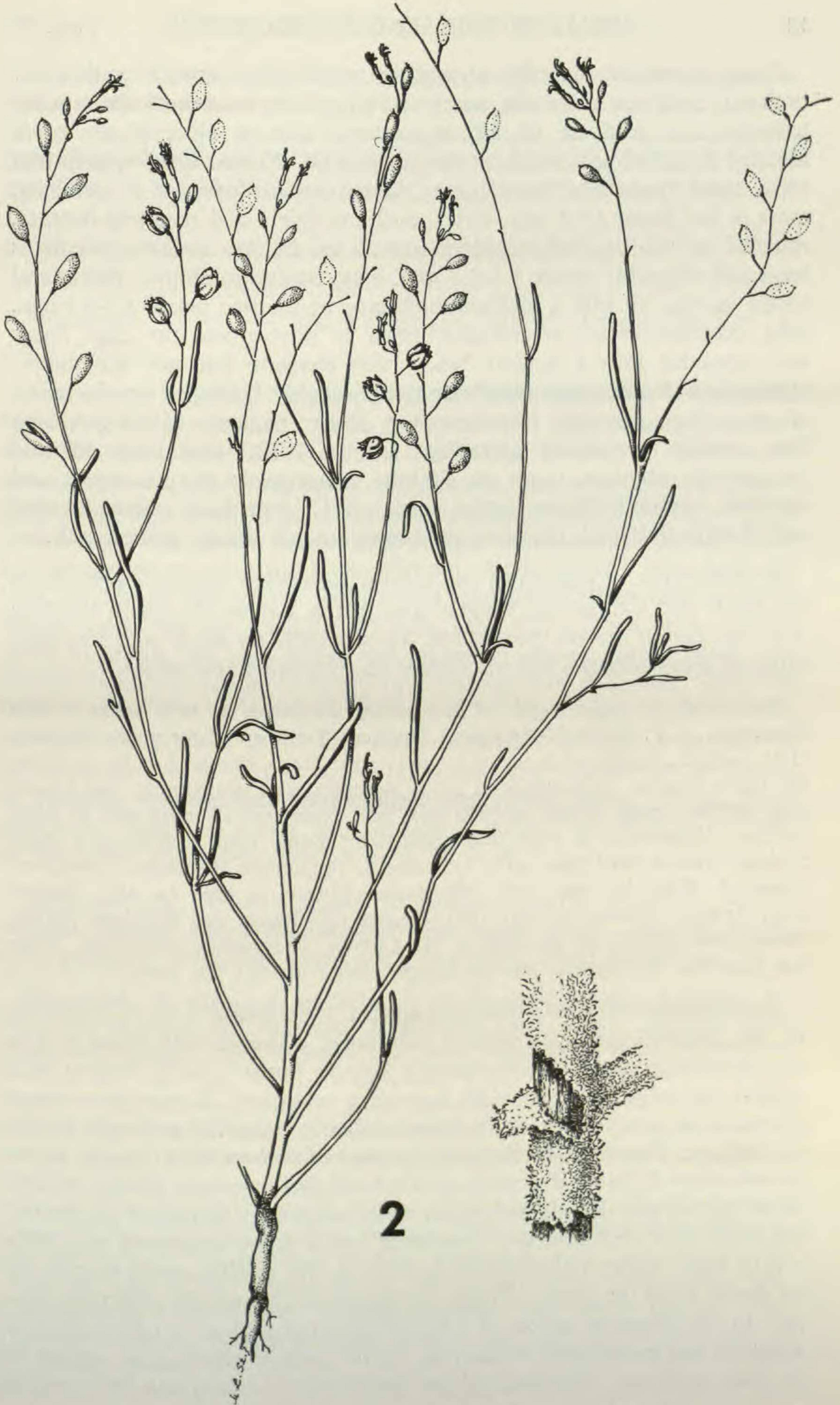


FIGURE 2. *Stenopetalum decipiens*. Habit, $\times 1/4$; detail of pubescence, $\times 2$.

Plants perennial, usually straggling subshrubs, densely pubescent; trichomes sessile or subsessile, much and irregularly branched, the rays interlocked into a dense felt-like tomentum, this on older plants often abraded by wind and sand; stems to at least 70 cm. long, woody and often much branched; basal leaves none; cauline leaves 1–5 cm. long, more or less linear (2–3 mm. wide), entire or finely and remotely dentate, rounded at the tip, inflorescences loose even before anthesis, the buds large and ellipsoid; sepals 3.5–4.5 mm. long, oblong to elliptic, the lateral sepals saccate, all with a gibbous thickening at the tip; petals 8.5–13 mm. long, chocolate-brown or purplish-brown to olive-green, the claw linear and expanded into a ligulate blade, this elongate but not acuminate; stamens 3.5–5 mm. long; glandular tissue roughly U-shaped on the inside of each single stamen; infructescences loose; pedicels (3.5)4.5–9 mm. long, usually divaricately spreading; siliques 7–10.5 mm. long, ellipsoid to narrowly obovate, terete to slightly compressed; stigmas small and capitate; ovules 5–10 per locule; seeds ca. 1.5 mm. long, oblong to oval and slightly flattened, the testa red-brown to dull orange and smooth.

DISTRIBUTION. Common in the central Australian ranges, especially in the Harts and George Gill ranges; also in the Barrow Range in Western Australia and in central Queensland. Occasionally on sandy soils but most often on stony hillsides and in crevices on rock faces and ledges.

Queensland. 70 miles north of Longreach, *Davidson* in 1953 (BRIU); near Eromanga, *S. T. Blake 11894* (BRI). **Northern Territory.** Tobermory, Nathans Hole paddock, *Chippendale* in 1954 (NSW, NT); Harts Range, 6 miles south of the Police Station, *Chippendale* in 1957 (AD, CANB, NSW, NT, PERTH); sand plain near Barrow Creek, *Gauba* in 1950 (W); Mt. Undoolya, 18 miles east of Alice Springs, *Chippendale* in 1956 (BRI, CANB, NT); Emily Gap, 9 miles e.s.e. Alice Springs, *Nelson 1814* (GH, NT); 1/2 mile s. Ooraminna Rockhole, Ooraminna Range, *J. Must 481* (GH, NT); Yuendumu, *Cleland* in 1951 (A, AD); Haast's Bluff Reserve, *Cleland* in 1957 (AD); George Gill Range and Kathlenn Spring, *Beaglehole 26961* (AD); s.e. side of Mt. Connor, *Beaglehole 22838* (AD). **Western Australia.** Mt. Squires, Barrow Range, *Helms* in 1891 (AD, NSW).

Stenopetalum decipiens owes the epithet ("deceiving") to its similarity to, and frequent confusion with, *S. velutinum*, a species with which it is in part sympatric, and to which name it keys in floristic works dealing with central Australia. Under central Australian conditions, *S. velutinum* seems always to be annual, but *S. decipiens* is clearly perennial and very woody at the base. Plants of the latter (from seed of *Nelson 1814*) grown in the greenhouses of Harvard University were, at three months, clearly woody. Both species are densely pubescent with irregularly branched trichomes, but those of *S. decipiens* are interwoven into a felted tomentum and, with a little care, strips of this tomentum four or five millimeters in length can be peeled from the stems. These interlocked trichomes are especially subject to the abrasive action of wind-blown sand and as a result of such abrasion and excoriation of the thin "bark" mature plants may appear to be quite glabrous. Remnants of the indumentum usually can be found in

leaf axils and stem axils. *Stenopetalum decipiens* has large siliques, on longer pedicels, than does *S. velutinum*, and smooth rather than tuberculate seeds. In both growth form and habitat, *S. decipiens* is much like *Arabidella filifolia*, also a straggling perennial, which often is found on rock faces in the Flinders Ranges of South Australia (Shaw, 1965).

8. *Stenopetalum velutinum* F. Muell. Plants Indig. Col. Vict. 1: 49. 1862. MAP 3.

HOLOTYPE. Victoria or South Australia. Murray Desert, *Mueller* [?] (MEL 10866).

Plants erect annuals, densely pubescent; trichomes sessile or subsessile, very irregularly branched; stems 1–4(6.5) dm. long, usually branched near the base; basal leaves to ca. 7 cm. long, lanceolate, entire or remotely dentate, withering early and usually lost from fruiting plants; cauline leaves 1–7 cm. long, 1–9 mm. wide, lanceolate to linear, entire or remotely dentate, sessile or shortly petiolate; inflorescences initially dense but elongating at anthesis, buds ellipsoid; sepals 3.5–5.5 mm. long, oblong or elliptic, the lateral saccate, the median cucullate with a callose thickening at the tip; petals 6–21 mm. long, 0.7–1.2 mm. wide, yellow-green to brown, the claw linear and expanded into an elliptic blade, this usually extended into an elongate tip; stamens 3–6 mm. long; glandular tissue a crescentic or rhomboid lobe on each side of each single stamen; infructescences loose, to 20 cm. long; pedicels 2–10 mm. long, slightly spreading or erect; siliques 4.5–6.5(8) mm. long, subglobose to oblong or obovoid; stigmas depressed-capitate and rather fleshy; ovules 10–20 per locule; seeds 1–1.5 mm. long, oblong or elliptic and flattened, orange- or red-brown and tuberculate. $n = 4$, $2n = 8$.

DISTRIBUTION. Widely spread throughout central Australia, also in western Victoria, and in southwestern New South Wales. Although a common species, *S. velutinum* seems never to occur in great abundance.

Queensland. 20 miles west of Miles, *S. T. Blake* 5905 (BRI); Armadilla, between the Warrego and Maranoa, *Barton* 231 (MEL, NSW); between Stokes Range and Cooper's Creek, *Wheeler* (BM, MEL). New South Wales. Brewarrina, *Boorman* in 1903 (BM, NSW); Wanganella, *Officer* in 1903 (NSW). Victoria. Nhill, *St. Eloy d'Alton* 8 (MEL). South Australia. Pedirka, *Ising* in 1932 (AD); gibber plain 43 miles south of Oodnadatta, *Lothian* 2183 (AD); Sundown to Granite Downs, *Burbidge & Gray* 4591 (CANB); 38 km. east of Teyon H. S., *Shaw* 462 (AD); 11 km. north of Mable Creek, *Shaw* 521 (A, AD); Ooldea, *Daisy Bates* in 1920 (AD); Mt. Harriet, *Eichler* 17264 (AD, NSW); Piltardi, in Mann Ranges, *Wilson* 2541 (AD). Northern Territory. Ruby Gorge, Hale River, *Beaglehole* 20725 (MEL); Haast's Bluff Reserve, *Cleland* in 1957 (AD); between Mt. Cavanaugh and Victory Downs H. S., *Beaglehole* 22767 (MEL); Mt. Olga, *Chippendale* in 1956 (AD, NT). Western Australia. West end of Hopkins Lake, *Symon* 2323 (ADW); Wingelena Camp, *Wilson* 2366 (AD); Mt. Eveline, east of Warburton, *George* 3864 (PERTH); Victoria Desert, Camp 54, *Helms* in 1891 (MEL).

Stenopetalum velutinum sometimes is confused with *S. lineare*, the result of that species having been described by De Candolle as glabrous with a subsequent misapplication of the name *S. lineare* var. *canescens*, as in Black's *Flora of South Australia*, to the inland form of *S. lineare*. *Stenopetalum velutinum* has all parts of the plants, even the axes of the inflorescences and the sepals, densely pubescent with appressed trichomes, while plants of *S. lineare*, although often quite densely pubescent towards the base, have the upper parts of the stems glabrous or nearly so. Most closely related to *S. velutinum* and sympatric with it is *S. decipiens* which can be distinguished by the perennial habit and very dense felt-like tomentum.

EXCLUDED SPECIES

- STENOPETALUM DRABOIDES Hooker, *Icones Plantarum t. 617*. 1844. Holotype. Western Australia. Swan River, *Drummond* ("Crucif. n. 3") (κ) = *Menkea draboides* (Hook.) Benth.
- STENOPETALUM INCISIFOLIUM Hooker f., *Icones Plantarum t. 276*. 1840. Holotype. Tasmania. "Hab. Blackman's River, on the Road to Hobart Town, Van Dieman's Land," *Gunn 644* (κ), isotype (GH) = *Hutchinsia procumbens* (L.) Desv.
- STENOPETALUM PROCUMBENS Hooker, *Icones Plantarum t. 610*. 1844. Holotype. Western Australia. Swan River, *Drummond 3* (κ) = *Menkea australis* Lehm.
- STENOPETALUM TRISECTUM Tate, *Handb. Flora Extratrop. S. Austral.* 17 [in sched.]. 1890. Holotype. South Australia. Innamincka, *McLeod* in 1884 (MEL). The type seems to be a diseased specimen of *S. lineare*.

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ADDENDUM (see comment under *S. lineare*):

In Margaret Willis' *By Their Fruits* (Sydney, 1949) there is a photograph of a specimen of *Helichrysum* collected by Mueller on Lefevre Peninsula on 16 December, 1847, the day after he and his sisters landed. The sheet was annotated by James H. Willis of the National Herbarium of Victoria with the suggestion that this may have been Mueller's first botanical specimen from Australia. However, the comment on the label of the *Stenopetalum* leaves, I think, no doubt that it was crucifer rather than composite which first attracted the Baron's botanical attention.

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